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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/619,703

12/08/2003

Tamer Kadous

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03/28/2005

Qualcomm Incorporated
Patents Department
5775 Morehouse Drive
San Diego, CA 92121-1714

EXAMINER

NGUYEN, BRIAN D

ART UNIT

PAPER NUMBER

2661

DATE MAILED: 03/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/619,703

Applicant(s)

KADOUS ET AL.

Examiner

Brian D Nguyen

Art Unit

2661

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on the amendment filed on 12/16/04.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19-24 and 26-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 19-24 and 26-50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 42 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 42 recites the limitation "the second data symbols" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 26-33, 35-38, and 40-50 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhang et al (2003/0223516).

Regarding claim 26, Zhang discloses a wireless communication multi-input multi-output apparatus, comprising: at least two antennas; and a processor coupled to each of the at least two antennas, the processor comprising an interference cancellation unit configured to receive a data

Art Unit: 2661

stream received at the at least two antennas and a decoded data stream generated by the processor (see figures 3 & 4; paragraph 0038).

Regarding claims 27-33, Zhang discloses different stages with different processors and interference cancellation units and other limitations described in claims 25-33 (see figures 4-6; paragraphs 0040-0043 and 0050-0051).

Regarding claims 35-38 and 40-50, claims 35-38 and 40-50 have substantially the same limitations as described in claims 26-33 in which the interference cancellation is performed via a successive interference cancellation strategy (see figures 4-6; paragraphs 0028, 0040-0043 & 0050-0051).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 34 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al (2003/0223516).

Regarding claims 34 and 39, Zhang does not specifically disclose processor is selected from a group consisting of an ASIC, DSP, DSPD, PLD, or FPGA. However, to select a processor from any one in this group is a matter of choice to meet the design criteria of a particular implementation.

7. Claims 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al (2003/0223516) in view of Foschini et al (2002/0142723).

Regarding claim 19, Zhang discloses a method of processing symbols received in a multi-carrier multiple-input multiple-output (MIMO) communication system, comprising: obtaining a plurality of streams of received symbols for a plurality of receive antennas, wherein each of the plurality of streams of received symbols includes symbols received on a plurality of subbands of an associated receive antenna, and wherein the plurality of streams of received symbols include at least one stream of transmitted symbols such that the transmitted symbols in each of the at least one stream are sent from a plurality of transmit antennas and such that the at least one stream starts in the same subband, wherein the plurality of streams of received symbols are received at approximately the same time; and processing the plurality of streams of received symbols to recover the at least one stream of transmitted symbols utilizing an interference estimation from another stream of the plurality of streams (see abstract; figures 4 & 6; paragraphs 0028-0029 & 0039-0041). Zhang does not specifically disclose multiplexing. However, this feature is well known in the art. Foschini discloses multiplexing (see figure 10). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to multiplex signals as taught by Foschini in the system of Zhang in order to effectively use of communication channels.

Regarding claim 20, Zhang discloses the processing includes performing equalization on the plurality of streams of received symbols to detected the at least one stream of transmitted symbols, and recovering each detected stream of transmitted symbols (see figure 4).

Regarding claim 21, Zhang discloses the processing is based on a successive interference cancellation (SIC) technique (see paragraph 0041).

Regarding claims 22 and 23, Zhang discloses the processing includes performing equalization on the plurality of streams of received symbols to detect a first stream of transmitted symbols in the at least one stream, recovering the detected stream of transmitted symbols, estimating interference due to the recovered stream of transmitted symbols, and canceling the estimated interference from the plurality of streams of received symbols to obtain a plurality of streams of modified symbols, and wherein the performing and recovering are repeated on the plurality of streams of modified symbols to recover a second stream of transmitted symbols in the at least one stream, wherein the interference is estimated based on a coded interference estimation technique (see figure 4 and paragraph 0039-0042).

8. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over (2003/0223516) in view of Foschini et al (2002/0142723) as applied to claim 19 above, and further in view of Ko et al (6,744,813).

Regarding claim 24, Zhang in view of Foschini does not specifically disclose a rate is determined based on a received signal quality. However, Ko discloses a rate adaptive system in which rate is determined based on error rate or noise (see col. 4, lines 11-25). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to adjust the rate in order to improve the quality of the communication.

Response to Arguments

Art Unit: 2661

9. Applicant's arguments with respect to claims 19-24 and 26-50 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Rashid-Farrokhi (2002/0027985), Pautler et al (2003/0185309), and Muharemovic et al (2003/0026345).

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian D Nguyen whose telephone number is (571) 272-3084. The examiner can normally be reached on 7:30-6:00 Monday-Thursday.

Art Unit: 2661

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chau Nguyen can be reached on (571) 272-3126. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



3/19/05

BRIAN NGUYEN
PRIMARY EXAMINER